

The Cell Design Issues in DMFCs for Cellular Phone Application: Multi-Pocket Pack® Design

Sanghyun Lee, Seh-Keun Jeon, Hoo-Gon Choi[†],
Sung Min Cho, Youngkwan Lee, Jae-Do Nam,
and Chan-Hwa Chung

[†] *School of System Management Engineering,
Sungkyunkwan University, Suwon 440-746, Korea*

*School of Chemical Engineering, Sungkyunkwan
University, Suwon 440-746, Korea*

Recently, many attempts have been made in DMFC pack manufacturing for the application in portable electronic devices. The size of the fuel cells for cellular phones and laptop computers should be small as much as that of commercially available Li batteries and the cells must be operated at room temperature without any external facilities such as liquid pumps and fuel reformer. To meet these requirements, the improvement of cell performance and the compact design of multi-cell pack are essential.

We have newly developed a **multi-pocket pack®** design for the portable DMFCs, which is shown in Fig. 1. Each pocket cell is made of a flexible plastic foil that is widely used in food industries. This plastic foil is easily folded and electrically non-conductive. As shown Fig.1, one pocket cell consists of two MEAs. The catalyst loadings for each of the MEA in the pocket cells are in the range of 5~10 mg/cm² for both the cathode (Pt black) and the anode (Pt/Ru black). Each MEA size is 1cm×3cm. The methanol in the reservoir contacts the outside of the pocket and the air (or H₂O₂) is supplied to the inside of the pocket cell. We have tested this multi-pocket pack at room temperature under air breathing or H₂O₂ oxidant filling conditions. The unit cell performance was about 10 mW/cm² and we have succeeded in operating a cellular phone (operation mode: 300mW; standby mode: 100mW) with a pocket pack® of 6 pocket cells. Overall multi-pocket pack dimension is 4cm×2cm×7cm including methanol reservoir volume.

In the presentation, we will also discuss on the essentials and difficulties in the compact DMFC pack design for the cellular phone application. The comparison between the “Flat Pack” DMFC design and our “Pocket Pack” DMFC design will be made.

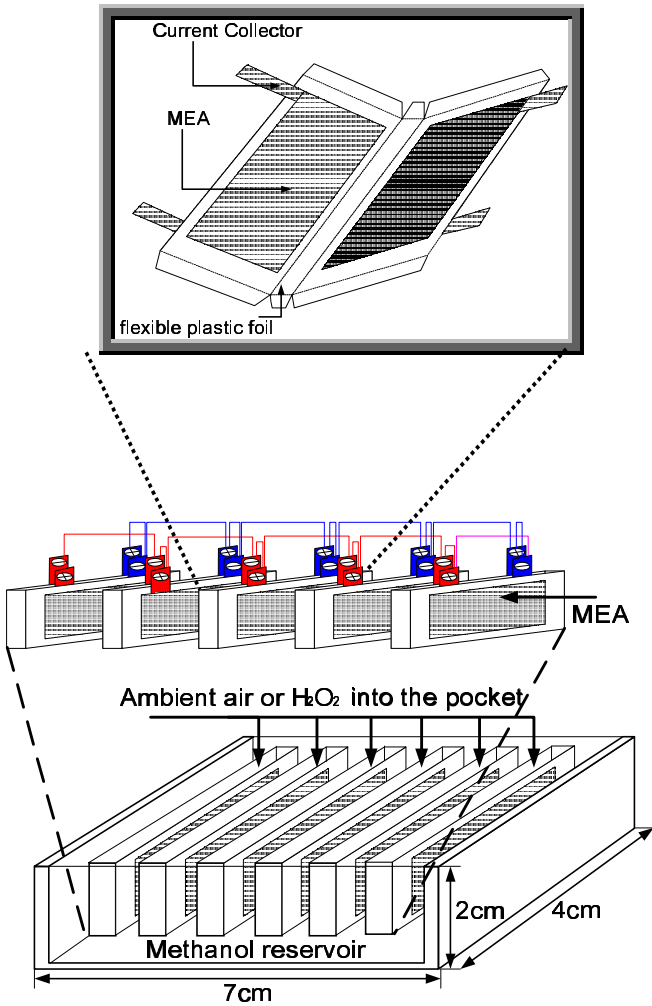


Fig. 1. The schematic diagram of Pocket Pack® design

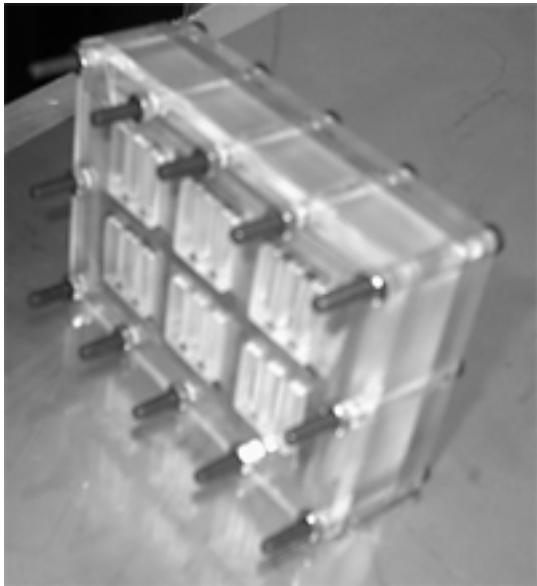


Fig. 2. The photograph of a 12-cell air-breathing DMFC flat pack.